

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-36 are currently pending in this case, Claims 6-16 and 22-32 being withdrawn as directed to non-elected inventions. Claims 1, 4, 5, 17, 20, and 21 have been amended and Claims 33-36 have been added by the present Amendment.

In the outstanding Office Action, Claims 1-5 and 17-21 were rejected under 35 U.S.C. §112, second paragraph; Claims 1, 4/1, 17, and 20/17 were rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Japanese Patent Publication 11-102440 of Onoguchi Kazunori (hereinafter "Ogonuchi'440") and U.S. Patent 5,694,483 of Ogonuchi (hereinafter "Ogonuchi'483"); Claims 2, 3/1, 3/2, 4/2, 4/3 and 18, 19/17, 19/18, 20/18, 20/19 were rejected under 35 U.S.C. §103(a) as being unpatentable over the combination Ogonuchi'440 and Ogonuchi'483 as applied to Claims 1 and 17 and further in view of applicants' admitted prior art; Claims 5/1 and 21/17 were rejected under 35 U.S.C. §103(a) as being unpatentable over the combination Ogonuchi'440 and Ogonuchi'483 as applied to Claims 1 and 17 and further in view of K. Storjohann et al., "Visual Obstacle detection For Automatically Guided Vehicles", IEEE International Conference on Robotics and Automation, pages 761-766, 1990 (hereinafter "Storjohann"); Claims 5/2 5/3, 21/18, 21/19 were rejected under 35 U.S.C. §103(a) as being unpatentable over the combination Ogonuchi'440 and Ogonuchi'483 as applied to Claims 1 and 17 and applicants' admitted prior art as applied to claims 2, 3, 18 and 19 and further in view of Storjohann.

In response to the rejection of Claims 1-5 and 17-21 under 35 USC §112, second paragraph, Claim 1 and 17 have been amended to correct the antecedent basis informality noted in the Office Action. Accordingly, the rejection under 35 USC §112 is believed to have been overcome.

In addition, Claims 4, 5, 20, and 21 have been amended to remove improper multiple dependencies. Accordingly, dependent Claims 33-36 have been added to define the intended original claim scope.

Briefly recapitulating, Claim 1 is directed to an obstacle detection system, a non-limiting example of which is shown in Figures 1 and 2. The obstacle detection system includes plurality of TV cameras for inputting multiple images, an image storage unit for storing a plurality of images inputted from the TV cameras, a feature extraction unit for extracting from the images, lines existing on a plane in a three-dimensional space, a parameter computation unit for determining a relation to hold between the projected positions of an arbitrary point on the plane, upon individual of the stored images, from the lines extracted by the feature extraction unit, and a detection unit for detecting a region absent from the plane, by using the relation computed by the parameter computation unit. Claim 1 has been amended to clarify that "the parameter computation unit [is] configured to predetermine said relation in a still state, and to determine an updated relation upon an elapsed time based on the relation in a still state and the movement in said plane during the elapsed time of at least one line extracted by said feature extracting unit." The changes to Claim 1 are supported by the originally filed specification (page 27, line 20 to page 28, line 9), and do not add new matter.

Regarding the rejection of Claim 1 under 35 U.S.C. §103(a), the Office Action asserts that Ogonuchi'440 discloses all the elements in Claim 1 with the exception of the feature extracting unit for extracting lines existing on a plane in a three dimensional space, and relies on Ogonuchi'483 to remedy that deficiency.

Onoguchi'440 discloses an obstacle detection system based on comparison of the images of cameras in an area where there is a marked crosswalk on the road. The cameras are fixed relative to each other and the area monitored. The method disclosed in Ogonuchi'440 aims to identify moving objects in a fixed area as shown in Figures 6 and 7, using a set of

reference points. The obstacles are detected based on the comparison between images obtained by two cameras, after these images are projected in a common view. The reference points are monitored in the images projections. The relation used for projecting the images before being compared on purpose of obstacle detection, does not vary in time as the cameras positions and the reference points do not move. In contrast, as recited in Claim 1, Applicants include a parameter computation unit “configured to predetermine the relation in a still state, and to determine an updated relation upon an elapsed time based on the relation in a still state and the movement in the plane during the elapsed time of at least one line extracted by the feature extracting unit.” By updating this relation, the claimed system has the capability to continuously monitor obstacles in a plane, even when the cameras are subject to movement, vibrations or tilt relative to the plane monitored¹.

In Ogonuchi’483, lines are extracted from a left image and a right image as shown in Figure 3. The lines are used to choose matched sample points from two pairs of edges as shown in Figure 9. The matched points position are used to calculate a projection plane equation. The images are then projected in the calculated three dimensional planes, for measuring distances in these planes. The cameras are fixed and the monitored object is fixed. There are different projection planes, but the projection relations are not updated over elapsed time in relation to a predetermined relation in a still state. On the contrary the Ogonuchi’483 method merely determines distances on plane projections of a static multi-faced object, so that while Ogonuchi’483 discloses extraction of lines, it does not teach the claimed parameter computation unit “configured to predetermine said relation in a still state, and to determine an updated relation upon an elapsed time based on the relation in a still state and the movement in said plane during the elapsed time of at least one line extracted by the feature extracting unit.”

¹ See page 27, line 25 to page 28, line 9.

Therefore, Ogonuchi'483 fails to cure the deficiencies in Ogonuchi'440, and it is respectfully submitted that amended Claim 1 patentably distinguishes over Ogonuchi'440 and Ogonuchi'483 whether considered alone or in combination.

Claim 17 recites features analogous to those above discussed in relation to Claim 1. Accordingly, for the reasons state above, the rejection of Claim 17 under 35 U.S.C. §103(a) as being unpatentable over the combination of Ogonuchi'440 and Ogonuchi'483 is likewise respectfully traversed.

The background art discussed in the application (page 3, line 4 to page 4, line 8), and Storjohann have also been considered, but are deemed no more pertinent to the claimed invention than the Ogonuchi'440 and Ogonuchi'483 references above discussed. Accordingly, it is respectfully submitted that amended Claims 1 and 17, and the claims dependent therefrom patentably define over the cited art.

Consequently, in light of the above discussion and in view of the present amendment, no further issues are outstanding. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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